NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

BACHELOR OF ELECTRONIC ENGINEERING (HONS) DEGREE

Final examinations
January 2013

TEE 3121 **Analogue Communications Engineering**

Duration of Examination 3 Hours

Instructions to candidates:
1. Answer any **five** questions only.
2. Each question carries equal marks.
3. Explain all your steps clearly in any solution.
4. Start the answers for the new question on a fresh page.

QUESTION 1

Draw the block diagram of analog cellular system and explain the main functions of each block. [20]

QUESTION 2

a) Discuss the roles of modulation in communication systems. [12]

b) Classify telecommunications signals subjectively. [8]

QUESTION 3

A sinusoidal signal of frequency 15 kHz modulates the frequency of a 10 V 100 MHz carrier, causing a frequency deviation of 75 kHz.

a) Sketch the amplitude spectrum of the FM signal, including all spectral components of amplitude. [14]

b) Determine the fraction of the total power contained in the frequency band 99.93 MHz to 100.07 MHz. [6]

QUESTION 4

Carry out a detailed review of the structure and features of the three standard types of a coaxial fibre. [20]

QUESTION 5

An audio signal $v_m(t) = 30 \sin (5000\pi t)$ V modulates the amplitude of a carrier $v_c(t) = 65 \sin (50000\pi t)$ V.

a) Sketch the AM waveform [6]

b) Calculate the modulation factor. [4]

c) Determine the modulation sensitivity that would give a modulation index of 80%. [4]

d) If the message signal amplitude is changed to a new value that is 6 dB below the carrier amplitude, determine the resulting modulation factor. [6]

QUESTION 6

a) An amplifier has a noise figure of 3,5 dB. Determine its noise factor, noise temperature and noise power density. [6]

b) What is flicker or 1/f noise? [6]

c) How the signal -to -noise (SNR) ratio is defined? [8]

QUESTION 7

Discuss the basic principle of Frequency and Phase Modulation in detail. [20]

QUESTION 8

Explain how a super group signal is generated using two stages of multiplexing with the aid of suitable diagrams. [20]

End of examination paper